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Aside from the migrations, the most interesting observations, I think, were on the Say Phoebes, which stayed about feeding on insects over the surface of the water, and then disappeared as soon as the weather became fairly good. The little flock of Scaups staying so long on the pond was also somewhat remarkable. As I have remarked above, the number of Myrtle Warblers was extremely unusual.

*Colorado Springs, Colorado, January 6, 1919.*

## LOSSES SUFFERED BY BREEDING BIRDS IN SOUTHERN CALIFORNIA

By H. ARDEN EDWARDS

ANY EFFORTS at estimating the probable increase or decrease of our native birds must take into consideration the very considerable loss sustained by them during their breeding season. A record of such known losses shows a surprising percentage of eggs and young birds destroyed during any one year, and the careful observer will at once notice a certain number of contributing causes which are fairly constant.

Taking these different factors in the order of their importance, we find that predatory mammals and birds hold first place. Preëminent among mammals is the common house cat; but the weasels, skunks, and coyotes also figure importantly. When I write predatory bird, my mind does not picture at once some noble falcon or swift flying raptor, but rather that skulking robber of the woodlands, the California Jay. Next as causes of loss come the rare storms of wind and rain, which, while of short duration, bring widespread damage, especially to nests and eggs. Thirdly, there is the ignorance and carelessness of man, which adds no small amount of destruction to the general total. And lastly, we may include the partial sterility of the birds themselves. I say partial, as I have never come across an instance where an entire clutch of eggs was lost from this cause.

To return to the first factor, we will naturally expect to see the preponderance of effect exerted here. Nature is always destructive in a constructive sense. Everything is sooner or later destroyed that something else may live. Death is written large upon every bird. The blossom only fulfills its purpose when it has faded and made way for the perpetuating seeds. So it is in bird life also; a bird may fulfill a purpose when it furnishes a meal for a wild animal; but when it falls prey to a tame cat, I fear Nature has been cheated.

Nature surely intends that no one species shall prey to excess upon some other species; therefore, the specialization which is evolved in the way of protective coloration, and defensive organs and habits. Take, as a specific instance, the orioles. The South American branches of this family have developed some remarkable methods of defense, such as that of the Caciques—which suspend their nests only in trees containing the nests of a very pugnacious species of wasp. Gadow tells us that in Mexico certain orioles have learned to tie their nests to the telegraph wires, where it is almost impossible for anything without wings to reach them. Our own North American species of oriole have learned to construct nests which insure a degree of safety, even from the marauding owl.

Now if Nature intended owl to eat oriole to excess I am sure the owl would be specialized to a point where the protective nest of the oriole would cease to be a hindrance. But when I see the amount of damage done by the jay, I feel as if Nature had slipped a cog somewhere; for, so far as I can see, the majority of birds have no means of protection against this arch robber.

I believe that nests of the type of those of the Bush-tit and Cactus Wren are primarily for protection against avian thieves; for certainly a Cactus Wren's nest would offer but slight obstacle to creeping reptiles, and none at all to the various species of rats and mice which are common in most cactus belts. To speak from personal knowledge: on the Mohave and Colorado deserts, and particularly the Mexican deserts, the large desert wood rats and ground squirrels cause the destruction of many nests. At Ensenada, Lower California, I examined colony after colony of the Bryant Cactus Wren, and found that a large percentage of the nests seemed to have been torn out by some small mammal.

In the case of the jay, as if to offset in some degree its ability to create mischief, Nature has endowed it with a cowardly disposition, and the average small bird when aroused will put it to flight. I imagine the sudden appearance of an angry wren or bush-tit at the door of its nest would rout the bravest jay. I think that the jay does most of its stealing of eggs and young when the parents are away. In the case of some of the very small birds it probably tries intimidation. I came across one instance of this kind this past spring. My attention was attracted by the actions and excited calls of a pair of Western Gnatcatchers in a clump of live-oaks. Approaching under cover of some adjacent bushes, I was able to see the cause of the disturbance. It was a jay, and he evidently had his eye on the contents of the dainty little nest of the Gnatcatchers near by. Heedless of their protests he was working his way nearer and nearer, but just when anticipation was merging into realization I shattered his hopes with a fusillade of rocks. It is a safe rule never to approach a nest openly if a person be in a locality where jays are plentiful. To do so spells certain ruin for that particular nest.

The crow must also be included as a destroyer of eggs and young birds, but it is harder to catch in the act. Personally I know of but few instances of destruction wrought by crows where the evidence was conclusive. Years ago, in Illinois, I was much amused when I caught a crow in the act of eating the eggs in another crow's nest; if this wasn't exactly a case of crow eat crow, it was at least a case of poetic justice. Another instance of its egg eating propensity was the destruction by a crow of a set of eggs of the Red-bellied Hawk in Los Angeles County, California. The remains of shells and contents, and a tell-tale black feather, told the story. This was in a locality where crows were nesting, and were very plentiful.

A storm in the late spring of 1918, although lasting but a few hours, was of such intensity and accompanied by such wind, that it caused the destruction of innumerable nests, especially pendant ones. Another cold, heavy rainstorm lasting several days visited southern California in June of the same year, at a time when normally all rains are over for the season. It played havoc with the hummingbirds and vireos especially, as they were at the height of their breeding season. While these storms cannot be classed as a constant factor in this part of the state (and I fancy nesting periods are pretty well adjusted to

seasonal conditions elsewhere) they cannot be totally disregarded in the general summing up of results.

A great many instances of loss through ignorance of man might be named. In this section the Valley Quail has a penchant for placing its nest in the orange groves. Many nests are destroyed in such places when the orchard is cultivated.

Loss through sterility is probably less than from other causes. Yet every active collector can remember scores of instances in this category. A striking example is that of a pair of California Woodpeckers which nest every year in a large live sycamore near my house. The first set taken from them contained four eggs, three of which were infertile. Another set, the following year, contained one fertile and two infertile eggs. The next year the nest had one young bird and three infertile eggs, while sets numbers four and five, in succeeding years, each had five eggs, four in each set being infertile. This is an extreme case, but I believe that the Picariae are more subject to this condition than most avian groups.

I have only touched upon a few high lights of this interesting subject, but the student of conservation will find food for thought and agree with me that, where Nature takes such toll, it requires but little to tip the balance in the wrong direction. A list of instances where losses were suffered by breeding birds in southern California as taken from my notes for the year 1918, follows.

*Colymbus nigricollis californicus*. American Eared Grebe. A common loss is occasioned by eggs being kicked from the nest as the bird gets on or off. In every breeding colony I have examined, numbers of eggs could be found at the bottom of the pond about the nests.

*Sterna antillarum*. Least Tern. Cats are the greatest causes of loss with this species, I believe. I have found numerous deserted eggs and remains of birds among the colonies, and W. Lee Chambers mentioned a case where cats were practically exterminating an entire colony near Venice, California.

*Ægialitis nivosa*. Snowy Plover. As with the Least Tern, cats do much damage.

*Lophortyx californica vallicola*. Valley Quail. Two nests were destroyed by young children, a number of others in orange groves, and one by a house cat which ate the female bird.

*Lophortyx gambeli*. Gambel Quail. Wright M. Pierce and myself found a nest of this species in the Coachella Desert, from which the parent had been eaten by some animal, judging from a number of broken eggs and other evidence present.

*Melanerpes formicivorus bairdi*. California Woodpecker. Sterility common.

*Colaptes cafer collaris*. Red-shafted Flicker. Sterility common. One set of six contained three addled eggs.

*Chordeiles virginianus hesperis*. Pacific Nighthawk. Sterility. One set of two had one egg addled.

*Archilochus alexandri*. Black-chinned Hummingbird. Nine nests were destroyed by jays after one egg in each case had been laid, two were destroyed by man, and ten by a heavy storm.

*Calypte costae*. Costa Hummingbird. Thirteen nests were all destroyed, presumably, by jays, as several jays were caught in the act. A majority of these nests were situated in cactus and were rather conspicuous. Six nests were ruined by a heavy rain-storm.

*Calypte anna*. Anna Hummingbird. Four nests were destroyed by jays.

*Contopus richardsoni richardsoni*. Western Wood Pewee.

*Empidonax difficilis difficilis*. Western Flycatcher. Several nests were destroyed by storm. I do not believe the rains did much damage, but undoubtedly they delayed the breeding season several weeks.

*Xanthocephalus xanthocephalus*. Yellow-headed Blackbird. I found a nest of this species at Baldwin's Lake, Big Bear Valley, which was occupied by a large Garter Snake.

The snake was distended from eating, presumably, the eggs or young, but made its escape before I could make certain.

*Agelaius phoeniceus neutralis*. San Diego Red-wing. A large colony nested in a wheat field. Their nests probably all were destroyed, as the grain was ready to reap and the nests contained one or two eggs each.

*Euphagus cyanocephalus*. Brewer Blackbird. Seven nests were destroyed by people near a house: the birds annoyed a sick person.

*Carpodacus mexicanus frontalis*. House Finch. Numbers of these nests are torn down around dwellings, and on the deserts small mammals cause a heavy loss.

*Astragalinus tristis salicamans*. Willow Goldfinch. Two nests of this species were found which had been taken possession of by white-footed mice. The eggs were still in the bottom of the nest. This happens commonly.

*Astragalinus psaltria hesperophilus*. Green-backed Goldfinch. Newly hatched young were found dead under a nest after a wind storm.

*Junco oreganus thurberi*. Sierra Junco. Sterility seems to be common in this species, particularly in certain sections where the nests are placed in wet moss and fern banks, though perhaps loss is due to chilling.

*Melospiza melodia cooperi*. San Diego Song Sparrow. A number of nests found had been taken possession of by white-footed mice.

*Pipilo maculatus megalonyx*. San Diego Towhee. Four eggs disappeared over night. The nest was torn out, probably by an animal of some kind.

*Pipilo crissalis senicula*. Anthony Towhee. Fourteen nests were destroyed. Of these, one was destroyed by a gopher snake, two by jays, two by man, and the rest by unknown causes. This species suffers heavily during the nesting season. One reason for this is that the actions and calls of the birds attract attention to their nests.

*Passerina amoena*. Lazuli Bunting. This is another species whose home the white-footed mouse frequently preëmpts. The eggs may usually be found buried in the bottom of the nest.

*Petrochelidon lunifrons lunifrons*. Cliff Swallow. Practically as many nests as there were pairs of birds were destroyed in Claremont, as the birds persisted in nesting on the college buildings, where they were a decided nuisance. Repeated destruction of their nests, and dousing the birds by means of fire hose, did not discourage them. I suggested letting them complete their sets before destroying the nests. This was done, whereupon they removed to other buildings where they were unmolested.

*Vireo solitarius cassini*. Cassin Vireo. Four nests were destroyed by rain and windstorm. Mr. Pierce reports others destroyed by the same cause.

*Dendroica nigrescens*. Black-throated Gray Warbler. One nest was torn out, cause unknown.

*Wilsonia pusilla chryseola*. Golden Pileolated Warbler. Two nests, in which sets were never completed, were found in a marsh.

*Mimus polyglottos leucopterus*. Western Mockingbird. Three nests were destroyed by jays.

*Toxostoma redivivum pasadenense*. California Thrasher. The sets disappeared from seven nests. One pair nested near a house, one egg was laid, and hatched. When the young bird was full grown, another egg was laid in the same nest, and also hatched. Later a new nest was built in another tree, and again one egg was laid. This fell prey to a jay.

*Thryomanes bewicki charienturus*. San Diego Wren. Two nests were destroyed, one by man and one by a snake or small mammal, as it was inaccessible to anything else, being under a large pile of cactus.

*Chamaea fasciata henshawi*. Pallid Wren-tit. Three nests were destroyed; cause unknown.

*Psaltiriparus minimus minimus*. Coast Bush-tit. Eleven nests were blown to pieces by a windstorm; more were reported to me by others.

*Hylocichla ustulata ustulata*. Russet-backed Thrush. One nest was destroyed.

*Claremont, California, January 22, 1919.*